

PATENT ABSTRACTS OF JAPAN

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(54) FILM STRUCTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a film structure having good flatness without strain or twist curl even by laminating films of any slit positions in the case of laminating. SOLUTION: The film structure is obtained by laminating at least two biaxially oriented films so that an angle made by orienting main axes becomes 10 to 180°. Thus, the film having a heat shrinkage factor of the film at 150°C in an arbitrary direction of the film of -0.1 to 1% and a difference of the heat shrinkages at 150°C in two arbitrary directions of the film of a range of 0 to 0.3% is used.

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CLAIMS

[Claim(s)]

[Claim 1] The film structure which carries out a laminating and becomes in the film structure which comes to carry out the laminating of the biaxial oriented film of at least two or more sheets about the angle of nip formed in the directions of a main shaft of the orientation in a mutual film plane so that it may become 10 degrees or more and 180 degrees or less.

[Claim 2] The film structure according to claim 1 characterized by the amount of twist curl of this film layered product being 10mm or less.

[Claim 3] The film structure according to claim 1 or 2 characterized by using the film whose rates of a heat shrink of 150 degrees C in all the directions of this biaxial oriented film are -0.1% or more and 1% or less.

[Claim 4] The film structure according to claim 1, 2, or 3 to which a difference with a rate [of all the 2-ways of this biaxial oriented film / of a heat shrink] of 150 degrees C is characterized by using the film which is 0 - 0.3% of range.

[Claim 5] This biaxial oriented film is the film structure according to claim 1, 2, 3, or 4 characterized by coming to carry out a laminating through an adhesives layer.

[Claim 6] The film structure according to claim 1, 2, 3, 4, or 5 to which other films other than this biaxial oriented film are characterized by carrying out the laminating to this biaxial oriented film through an adhesives layer.

[Claim 7] The film structure according to claim 1, 2, 3, 4, 5, or 6 to which this biaxial oriented film is characterized by being polyester film.

[Claim 8] The film structure according to claim 1, 2, 3, 4, 5, 6, or 7 characterized by this film layered product being what used as an object for cards.

[Claim 9] The film structure according to claim 1, 2, 3, 4, 5, 6, or 7 characterized by this film layered product being what used as an object for flexible printed circuits.

[Claim 10] The film structure according to claim 1, 2, 3, 4, 5, 6, or 7 characterized by this film layered product being what used as an object for ink proofs.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the film structure which comes to carry out the laminating of the biaxial oriented film of two or more sheets. Furthermore, it is related with the film structure used for the application as which a severer property is

especially required in detail about the film structure with good smoothness which neither a strain nor twist curl produces about smoothness, such as an IC card, and an ink proof, FPC (flexible printed circuit board), also at post-processing processes, such as subsequent heating, distortion, etc. immediately after carrying out the laminating of the biaxial oriented film using heating, a solvent, etc.

[0002]

[Description of the Prior Art] Conventionally, the IC card serves as the film structure which stuck the protection film and base material film for being the film structure stuck on both sides of thin IC with the film of two sheets, and protecting wiring also in FPC. In order to consider as the film structure which stuck these films of two or more sheets here A base with IC for hot melt adhesive is put between one side of a film between these two laminated films behind a laminating. Although this is heated and stuck by pressure and carries out a laminating, and it considers as the film structure or is manufactured by slushing and carrying out the laminating of the hot melt adhesive between direct biaxial oriented films, and considering as the film structure etc. Since about 100-2000-degree C heat was added at this time, in order that a biaxial oriented film might carry out heat deformation, this structure by which the laminating was carried out was distorted, or the curl phenomenon called twist curl arose, and there was a problem of becoming that to which smoothness got worse as a result.

[0003] It was thought that this twist curl had been produced according to the relative difference of that contraction since the heat characteristics of the between [films] stuck differ. The film with which this is usually marketed is considered to be the phenomenon produced since properties, such as a rate of a heat shrink, differ delicately if it sees in a detail also by the same brand even if.

[0004] Although piling up using the films which doubled the slit location of film production, and performing laminating processing is also considered so that the location where the film produced by double width was also produced may become the same in order to carry out the laminating of the films which have the nearly completely same property About [that it cannot decide whether they are the films of the really same property by such approach] and stock control becomes very complicated, problems, such as lifting of management cost and lowering of productivity, arise, and implementation is difficult.

[0005] Then, in order to make in agreement the property of the films stuck even if it does not decide the slit location of film production and to make small dispersion in the orientation main shaft of the molecule produced in film production (Boeing phenomenon), the method of suppressing the various Boeing phenomena has been taken. The film which carried out vertical uniaxial stretching after a horizontal drawing by the tenter for example, once Open clip grasping and a film is again grasped with a clip after heat treatment. The approach (for example, JP,57-87331,A) of carrying out heat setting, while carrying out temperature up in a 120-240-degree temperature field, After preheating an unstretched film above drawing temperature, simultaneous biaxial stretching is carried out in the direction in every direction. Subsequently, the approach of making carry out division temperature up to an isothermal [every] multistage story, and carrying out reheating processing Film temperature is once lowered to below glass transition temperature immediately after a horizontal drawing. The increase of rigidity, (For example, JP,54-137076,A) The approach of carrying out thing prevention by which the film by the side

of a heat treatment room is drawn in a drawing room (For example, JP,3-13027,A, JP,3-216326,A) Instead of putting in the above-mentioned cooling process, a nip roll is formed between a horizontal drawing and heat treatment. The approach (for example, JP,63-24459,B) of advancing a center section compulsorily. Moreover, the method (for example, JP,61-233523,A, JP,62-83327,A, JP,62-183328,A) of heating a film so that the temperature of an edge may become high from the center section of the film after biaxial stretching etc. is proposed. However, although some Boeing phenomena decrease by such approach, unless it sorts out the location which cannot cancel the Boeing phenomenon, therefore carries out a laminating thoroughly, a strain and twist curl occur and the layered product which stuck these films cannot be used practically.

[0006]

[Problem(s) to be Solved by the Invention] In case this invention solves this trouble and a laminating is carried out, even if it sticks the film of which slit location, the smoothness which neither a strain nor twist curl produces offers the good film structure.

[0007]

[Means for Solving the Problem] The film structure of this invention which attains the above-mentioned object is the film structure which carries out a laminating and becomes about the angle of nip formed in the directions of a main shaft of the orientation each other film so that it may become 10 degrees or more and 180 degrees or less in the film structure which comes to carry out the laminating of the biaxial oriented film of at least two or more sheets.

[0008] In addition, for this reason, it is using concretely the film whose rates of a heat shrink of 150 degrees C in the direction of the arbitration of this biaxial oriented film are -0.1% or more and 1% or less as a desirable mode. Or a difference with a rate [of the 2-way of the arbitration of this biaxial oriented film / of a heat shrink] of 150 degrees C is using the film which is 0 - 0.3% of range still more preferably.

[0009]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail.

[0010] In this invention, it is the film structure which comes to carry out the laminating of the biaxial oriented film of at least two or more sheets, and about the angle of nip formed in the directions of a main shaft of the orientation of a mutual film, a laminating is carried out and it becomes so that it may become 10 degrees or more and 180 degrees or less. Preferably, a laminating is carried out and it becomes so that it may become 30 degrees or more and 180 degrees or less.

[0011] Here, with the main shaft of orientation, although a chain is made alternative in a specific direction orientation and an array by molecular arrangement, such as a drawing, in it, it can - Force, a direction can be said and it can ask for this by the approach with most arrays of a molecule measured from film physical properties, such as optical means of a refractive index, infrared radiation, etc., an X-ray diffraction method, and velocity of propagation of an acoustic wave.

[0012] Although the film of the property same as films to stick is required in order to suppress the strain and twist curl which are produced in case the laminating of the film of two or more sheets is carried out conventionally Although the approach of making small the gap include angle of the orientation main shaft of between [films] to be used was taken in order to attain this in simple becoming easy to produce curl, if heat and tension are given on the post-processing process and service condition after a laminating

although such [to be sure] the laminating structure can control the twist curl produced just behind a laminating -- comparatively -- easy -- being torn -- a crack -- being easy -- there are faults, such as things. This thought that it originated in the anisotropy of the structure by having set the orientation main shaft. The angle of nip greatly formed in the directions of a main shaft of the orientation of a mutual film so that the include angle between mutual orientation main shafts may turn into 10 degrees or more and 180 degrees or less then, preferably In order that the direction of orientation may be distributed and isotropy may come out by sticking films so that it may become 30 degrees or more and 180 degrees or less, When it is used in each processing or an application, it is hard coming to generate a problem which was mentioned above, and the film structure with a mechanical property and smoothness good [after processing or an activity] is obtained.

[0013] Of course, for that, it is very desirable that the rate of a heat shrink of 150 degrees C in all the directions of [within this biaxial oriented film side] uses preferably the film whose difference with a rate [of the 2-way of the arbitration in all the directions of this biaxial oriented film / of a heat shrink] of 150 degrees C it is 0.1% or less still more preferably, and is 0 - 0.05% of range preferably 0 to 0.3% further 0.3% or less 1% or less -0.1% or more.

[0014] The direction which calls a direction parallel to the direction of a film plane "the direction of [in a film plane]", and crosses in the direction of a film plane here is semantics to remove. Moreover, although the rate value of a heat shrink in 150 degrees C can be calculated under a certain direction about this film as difference ΔS of maximum with a rate [of a heat shrink] of 150 degrees C [in "all directions"] and the minimum value is 0 - 0.3%, I hear that difference ΔS of the maximum and the minimum value of this rate value of a heat shrink obtained when it asks for it under all directions is 0 - 0.3% of range, and there is. In addition, in this invention, in "all directions", since it was originally infinity, we decided to measure under the 5 directions as a rule of thumb in the direction of the arbitration which divided 360 degrees into 36 equally and which was shifted by a unit of 10 degrees, and to evaluate maximum and the minimum value by the five values. Although selection of a direction is made into arbitration, the direction which does not incline toward each other if possible is chosen.

[0015] Even if the dimension of a film changes with heating, extent of a heat shrink of the deformation, i.e., the rate in all 150-degree C directions, preferably -0.1 to 1% Thus, 0.3% or less, If it is small and distribution of the rate of a heat shrink in the field in all directions is moreover very smaller than a certain value, it will be hard to deform as the film structure which is a layered product of this film, consequently neither curl nor distortion will arise. That is, when it separates from the above-mentioned range, in order for the rates of a heat shrink between the films stuck to differ greatly, it becomes easy to produce twist curl in the film side contracted [more]. By making it this appearance, it is not necessary to obtain the film with which the need of sticking the film of the same slit locations also made small the difference of the orientation main shaft in the cross direction so that the include angle of a mutual orientation main shaft may become small like before. That is, the film structure which can reduce management cost and does not spoil functionality, either is obtained by considering as the film structure mentioned above.

[0016] Although are not limited, and especially the approach of sticking two or more

films which have this heat characteristic has an approach using adhesives, an approach by hot melt adhesive, etc., for example, since the glue line is as thick as 30-200 micrometers, its approach by hot melt adhesive is desirable. Especially as these adhesives, although not limited, in the case of polyester film, the hot melt adhesive of a polyester system is desirable in respect of the adhesion force.

[0017] As such the structure that carried out laminating unification, there are some which are specifically represented with the structures, such as acceptors, such as cards, such as an IC card, a magnetic card, and an optical card, circuit bases, such as FPC, and an ink proof. For example, in the case of an IC card, the both sides of the base which carried out the laminating of the required components, such as IC component, are put through hot melt adhesive etc. with the biaxial oriented film which has functional **** of two sheets, for example, concealment nature, and it considers as the film structure, it judges in required size after that, and an IC card is obtained. Moreover, when manufacturing FPC, copper foil is laminated with adhesives on the polyester film of one sheet, adhesives are used for a protection sheet on it, the laminating of another polyester film is carried out, and the film structure is created.

[0018] Thus, when the amount of twist curl of the obtained film structure was not 0.1mm or less and it is preferably used as applications, such as an IC card and FPC, still more preferably 1mm or less 10mm or less, it is for the problem of it becoming impossible to detect the functionality to arise.

[0019] In this invention, it is represented with polyester, polyolefine, a polyamide, a polyether, a polyphenylene sulfide (PPS), a polyacrylonitrile, a polycarbonate, etc. as a polymer presentation used for the film structure. Polyester is a compound which has an ester bond in a macromolecule principal chain. Specifically Polyethylene terephthalate (PET), polybutylene terephthalate (PBT), Polyethylene -2, 6-naphthalate (PEN), polypropylene terephthalate (PPT), As polyethylene-p-oxybenzoate (POB), Polly 1, 4-cyclo hexylene dimethylene terephthalate (PCT), and a copolymerization component For example, diol components, such as a diethylene glycol, neopentyl glycol, and a polyalkylene glycol, It is polyester resin which copolymerized dicarboxylic acid components, such as adipic-acid, sebacic acid, phthalic-acid, isophthalic acid, 2, and 6-naphthalene dicarboxylic acid, etc. Especially the homopolymers and those copolymers of Polly 1, 4-cyclo hexylene dimethylene terephthalate (PCT), polypropylene terephthalate (PPT), or polyethylene terephthalate (PET) are desirable especially. Moreover, although it is the polyalkylene glycol (PAG) represented with polyoxymethylene (POM) or a polyethylene glycol (PEG) as a polyether, even if it is not these homopolymers, the polyester ether PET, PBT, whose PEN, etc. are copolymers with polyester is sufficient.

[0020] Moreover, various kinds of additives, for example, an antioxidant, the antistatic agent, the crystalline-nucleus agent, the inorganic particle, the organic particle, etc. may be added by these high molecular compounds. Especially an inorganic particle and an organic particle are effective in order to give smoothability to a film front face and to raise the handling nature of a film. As a typical additive, a silicon dioxide, an alumina, a calcium carbonate, a zirconium dioxide, talc, a kaolin, a clay, a barium sulfate, titanium oxide, bridge formation polystyrene resin, bridge formation polyester resin, those mixtures, etc. can be used.

[0021] Moreover, as for this film, it is also desirable to have taken laminated structures,

such as surface conversion. As a laminated structure, the laminating by the co-extrusion, the laminating by spreading, etc. are employable. As a laminating by spreading, before carrying out the horizontal drawing of the film, a ** agent is applied to a film, and the method of performing desiccation of a solvent, horizontal drawing, and heat treatment within a tenter is performed preferably. These laminated structures are mainly performed in order to give the surface characteristic according to the application. Especially in the case of this invention, grant of various properties, such as the easy adhesiveness of the printing ink to the front face at the time of considering as the easy adhesiveness of the adhesives used for a lamination and an IC card and antistatic nature which stops static electricity, is possible.

[0022] Furthermore, as a film used for the structure of this invention, coloring additives, such as titanium oxide and a barium sulfate, were used, or the high white or the high black film of concealment nature is practical by making the air space by the void, firing, etc. contain.

[0023] The biaxial oriented film used for the structure of this invention means the film which extended in the longitudinal direction, and a longitudinal direction and a right-angled direction (cross direction). Specifically, a-less orientation film may be performed [after extending to a longitudinal direction] after extending melting extrusion, the thing extended crosswise, and crosswise substantially, combining the thing to extend to a longitudinal direction or a longitudinal direction, the thing to extend to crosswise coincidence and the drawing of a longitudinal direction, and a crosswise drawing two or more times.

[0024] Next, although an example of the manufacturing method of this invention is explained, of course, this invention is not limited to this.

[0025] The example using polyethylene terephthalate as polyester is shown. After carrying out the vacuum drying of the pellet of polyethylene terephthalate at 180 degrees C for 5 hours, it is supplied to the extruder heated by the temperature of 270-300 degrees C, and is extruded in the shape of a sheet from a T die. Drum skin temperature carries out adhesion solidification of this sheet by which melting was carried out according to the electrostatic force of drum lifting cooled by 25 degrees C, and the shaping film of amorphous state is obtained substantially. This film is heated by the 80-120-degree C heating roller group, a vertical drawing is increased [in a lengthwise direction] 3 to 6 times one step or multistage, and it cools by the 20-50-degree C roll group. Then, leading to a tenter and grasping the ends of this film with a clip, it preheats in the hot blast ambient atmosphere heated by 80-140 degrees C, and elevated-temperature heat treatment to 245-255 degrees C near the melting point of this polyester is continuously carried out a horizontal drawing three to 6 times and carried out to a longitudinal direction. cooling from this heat treatment -- it is in process and a longitudinal direction is performed, and when it is in a 100-160-degree C temperature requirement, about 1 - 12% of relaxation processing is performed crosswise. Although the longitudinal direction relaxed approach of contracting clip spacing is desirable as relaxation processing, grasping a film with the clip of a tenter in order to maintain smoothness, the floatation type heat treatment approach which does not grasp a film edge may be used. It is desirable to use the approach of narrowing the rail width of face of a tenter as crosswise relaxation processing. Thus, the biaxial oriented film of this invention is obtained by annealing and rolling round the obtained film to a room temperature.

[0026] Although it is also desirable to perform annealing treatment of the approach of carrying out roll aging processing of the rolled-round film roll and the sheet article which cut the film into the predetermined dimension here in order to obtain the biaxial oriented film of low heat shrink nature further, it is desirable at the point that the direction of the sheet processing by which the dimension is not especially restrained for a longitudinal direction and the cross direction becomes a rate of a low heat shrink. Of course, although each processing conditions (temperature, time amount, etc.) are changed suitably and made to optimize, it is usually below the glass transition temperature T_g of a polymer, and processing of about 2 - 48 hours is carried out.

[0027] The laminating of the biaxial oriented film of two or more sheets obtained in this way is carried out through adhesives, and it serves as the film structure of this invention. Of course, it is clear that other films other than the biaxial oriented film of this invention may be the structures which come to carry out a laminating between these biaxial oriented films through an adhesives layer.

[0028] The film obtained in this way is used for the application of cards, such as an IC card, a magnetic card, and an optical card, circuit bases, such as FPC, an ink proof, etc., and is obtained as the structure with good smoothness without twist curl.

[0029]

[The assessment approach of a physical-properties value] (1) the light sensing portion be set to 2 theta-positions which be equivalent to a field (-105°) with the transmission method of the narrow angle wide angle X-ray diffraction method between orientation main shafts, the inside of a film surface be scanned at 0 degree of gate angles to the circumferential direction which met crosswise, i.e., the outermost periphery of a pole graphic form, from the longitudinal direction, and the direction of a crystal main shaft be searched for from the peak location of the acquired intensity distribution so that the vector equivalent to the crystal main shaft (105°) in a film surface could detect a measurement sample. The direction of a main shaft of this orientation displayed the cross direction as 0 times. Of course, by this approach, it can measure also with the layered product used as the film structure, and is the efficient approach that it is once detectable by measurement, about the direction of the main shaft of the film of two sheets at this time.

[0030] As an approach of searching for the main shaft of orientation from the velocity of propagation of a supersonic wave, it is SONIC made from Nomura Business affairs, for example. SHEET The orientation main shaft of a film is measured using TESTER (SST).

[0031] (2) A circle with a diameter of 50mm is drawn on the sample sampled in heat contraction width of face of 50mm, and die length of 50mm, and the straight line which passes along a core in the direction of the arbitration which divided 360 degrees of a field into 36, and which it shifted 10 degrees at a time is drawn, and the die length (diameter of circle) of the straight line which crosses with a circle is measured with an omnipotent projector, and it is referred to as L_0 (mm). Next, after holding this sample for 30 minutes in the hot blast oven heated by 150 degrees C and cooling at a room temperature after that for 2 hours, again, linear spacing is measured to accuracy with an omnipotent projector, and it is referred to as L (mm). It considered as rate $= (L_0 - L) / L_0$ of heat shrink $0 \times 100(\%)$ from this measurement result.

[0032] (3) After carrying out melting maintenance of the sample about 5mg for 5 minutes at 300 degrees C on the saucer made from aluminum and carrying out quenching

solidification in liquid nitrogen, using a company disk station "SSC/5200" as data analysis equipment, using the robot DSC by SEIKO electronic industry incorporated company "RDC220" as a heat-characteristic **** scanning calorimeter, temperature up was carried out by part for 20-degree-C/ from the room temperature. Temperature of the point that the straight line in the equal distance and the curve of the phase status changed part of glass transition cross in the direction of an axis of ordinate was made into the glass transition point (T_g) from the straight line based on the transition to a rubbery state from the vitreous state observed at this time which each base line extended, and temperature of the top-most vertices of a fusion peak was made into the melting point (T_m).

[0033] (4) It is the amount film structure of twist curl 50x60mm 2 It started on the square, and put on plate-like, and the distortion height from plate-like [of four angles each] was measured. Among these, the biggest numeric value was made into the amount of twist curl.

[0034]

[Example] Although this invention is explained below based on an example, it is not limited to this.

[0035] After carrying out the vacuum drying of the pellet of the polyethylene terephthalate (T_g:69 degree C) of example 1 limiting viscosity 0.65 at 180 degrees C for 5 hours, the extruder heated by 280 degrees C was supplied and it fabricated in the shape of a sheet from the T die. Furthermore, the unstretched film which carried out adhesion solidification of this film by electrostatic force at cooling drum lifting with a skin temperature of 25 degrees C was obtained.

[0036] This unstretched film was heated by the 80-100-degree C heating roller group, the vertical drawing was carried out by the single step 3.3 times in the lengthwise direction, and it cooled by the 20-50-degree C roll group. Then, leading to a tenter and grasping the ends of this film with a clip Preheating in the hot blast ambient atmosphere heated by 90 degrees C, increasing a horizontal drawing 3.5 times in a longitudinal direction in a 95-degree C hot blast ambient atmosphere, performing heat treatment for 7 seconds at 250 degrees C in a tenter further, and cooling slowly to 100 degrees C after heat treatment The rail width of face of a tenter was contracted, crosswise, 5%, spacing of the clip of a tenter was contracted, 2% of relaxation processing was performed to the longitudinal direction, it cooled to the room temperature, and drawing and the edge part of the both ends of a film were trimmed and rolled round from the tenter. Since film width was 5m biaxial oriented film, the slit was carried out to 1m piece, and the biaxial oriented film with a thickness of 100 micrometers was obtained.

[0037] Although orientation main shafts differed greatly in the manufacture location of a film although the properties of the obtained film, such as a main shaft of orientation searched for in X-ray and a rate of a heat shrink, were shown in a table 2, and the film edge had shifted from the cross direction, this film edge and center section were piled up using polyester system hot melt adhesive (therefore, the narrow angle of a film 40 degrees), and the adhesion laminating was carried out by linear pressure 150 kg/cm between 120 - degree C heating rollers. It is the obtained structure 50x60mm 2 When it started on the square and twist curl was evaluated, the thing with the small amount of curl which has good smoothness was obtained.

[0038] Moreover, when the amount of curl of the structure after rolling round this

structure by the tension of 70kg / 1m to a 3 inch core at a longitudinal direction, respectively and leaving it at 55 degrees C for 24 hours was measured, curl was the small level which is satisfactory practically.

[0039] Like example 2 example 1, drawing and the edge part of the both ends of a film were trimmed and rolled round from the tenter, and the biaxial oriented film with a film width [of 5m] and a thickness of 100 micrometers was obtained. The slit of the film obtained in this way was carried out to 1m piece, further, annealing treatment was performed for 5 minutes in the hot blast oven heated by 150 degrees C after carrying out a slit to 1m length at a longitudinal direction, and the film with the very small rate of a heat shrink as shown in a table 2 was obtained.

[0040] The adhesion laminating of the narrow angle of the orientation main shaft measured in X-ray with this film was carried out like the example 1 using polyester system hot melt adhesive so that it might become large with 37 degrees. When twist curl of the obtained film structure was evaluated, there is no curl and what has good smoothness was obtained. Moreover, when the amount of curl of the structure after winding the longitudinal direction of the obtained film structure around a 3 inch core and leaving it at 55 degrees C for 24 hours was measured, it was that in which this does not have curl, either.

[0041] Except having made the rate of relaxation of the cross direction in example 3 example 1, and a longitudinal direction into 0%, completely like the example 1, drawing and the edge part of the both ends of a film were trimmed and rolled round from the tenter, and the biaxial oriented film with a film width [of 5m] and a thickness of 100 micrometers was obtained. The slit of the film obtained in this way was carried out to 1m piece, further, after carrying out a slit to 1m length at a longitudinal direction, annealing treatment was performed for 5 minutes in the hot blast oven heated by 150 degrees C, and the biaxial oriented film was obtained.

[0042] In the property of the obtained film, as shown in a table 2, the very small thing of the rate of a heat shrink was obtained.

[0043] The slit location set the film of a film edge, and the film of a center section in piles, and pasted up like the example 1 using polyester system hot melt adhesive so that the narrow angle of the orientation main shaft of this film might become large. When twist curl of the obtained structure was evaluated, the good thing of smoothness which has the small amount of curl was obtained. Moreover, the longitudinal direction of the obtained film structure was wound around the 3 inch core, and curl became small when the amount of curl of the structure after leaving it at 55 degrees C for 24 hours was measured.

[0044] Except changing the heat treatment temperature in example 4 example 1 into 240 degrees C, and changing the rate of relaxation of a longitudinal direction to 1%, completely like the example 1, ejection and the edge part of the both ends of a film were trimmed and rolled round from the tenter, and the biaxial oriented film with a film width [of 5m] and a thickness of 100 micrometers was obtained. After performing roll aging processing for the film obtained in this way at 65 degrees C for 10 hours, the slit was carried out to 1m piece, and the biaxial oriented film was obtained.

[0045] Although the property of the obtained film was shown in a table 2, the rate of a heat shrink was small.

[0046] The structure which piled up this film so that the narrow angle of an orientation

main shaft might become large like an example 1 was obtained. When the obtained structure itself and the twist curl after core volume attachment were evaluated, the amount of curl was small and smoothness was good.

[0047] Except changing the heat treatment temperature in example 5 example 1 into 230 degrees C, when evaluated like the example 1, what has the comparatively small amount of curl was obtained.

[0048] Except changing the crosswise rate of relaxation to 2%, and changing the rate of relaxation of a longitudinal direction for the heat treatment temperature in example of comparison 1 example 1 to 1% at 230 degrees C, like the example 1, drawing and the edge part of the both ends of a film were trimmed and rolled round from the tenter, and the biaxial oriented film with a film width [of 5m] and a thickness of 100 micrometers was obtained. Although the slit of the film obtained in this way was carried out to 1m piece and the biaxial oriented film was obtained, as compared with an example 1, the rate of a heat shrink is large a little, curl is large, and practical use could not be presented.

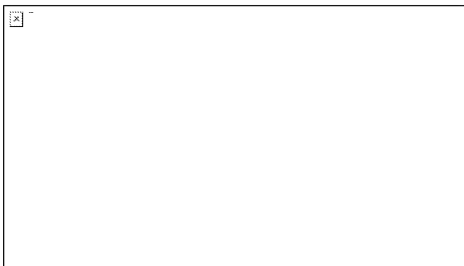
[0049] After extending crosswise in the tenter of example of comparison 2 example 1, clip grasping is once opened and it regrasped with a clip again, fixed-length heat treatment (0% of rates of relaxed) was performed, carrying out temperature up to 120-230 degrees C, and like the example 1, others trimmed and rolled round ejection and the edge part of the both ends of a film from the tenter, and obtained the biaxial oriented film with a film width [of 5m], and a thickness of 100 micrometers.

[0050] The property of the obtained film had the very large rate of a heat shrink, and the difference of the orientation main shaft in the edge and center section of the film did not almost have ****. Like this film example 1, in piles, when the amount of curl was measured, curl is large and could not present practical use with a film edge and a center section.

[0051] Completely like the example 2 of example of comparison 3 comparison, ejection and the edge part of the both ends of a film were trimmed and rolled round from the tenter, and the biaxial oriented film with a film width [of 5m] and a thickness of 100 micrometers was obtained. The structure was obtained like the example 1 except piling up a film so that the narrow angle of an orientation main shaft may become 0 times about this film. When the amount of curl of this structure was measured, the amount of curl is large and practical use could not be presented.

[0052]

[A table 1]



[A table 2]

A large empty rectangular box with a thin black border. In the top-left corner, there is a small square icon containing a stylized 'x' or cross symbol.

[0053]

[Effect of the Invention] Even if it sticks the film of which slit location in the case of a laminating according to the film structure of this invention, also in case there is no generating of a strain or twist curl and it uses for applications, such as the time of being processing, an IC card, and FPC, the smoothness which curl does not generate is the good structure and it becomes possible to aim at reduction of management cost, and improvement in productivity.

[Translation done.]
